

Effects of Jovian Migration on Nascent Planetary Systems

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We have performed dynamical simulations of young planetary systems undergoing migration of a Jovian-type planet to investigate the impact of migration on a remnant planetesimal disk and embedded protoplanets. Standard Keplerian orbits are strongly perturbed due to scattering and movement of induced resonances, increasing eccentricity and radial mixing within the planetesimal swarm. We explore the resulting dynamical effects on existing protoplanetary cores and interactions with the dynamically excited planetesimal disk. In particular, we show that a significant fraction of existing protoplanets can survive scattering by the Jovian-type planet, and may re-circularize within the Habitable Zone. We also show that the excited planetesimal disk can cause a significant increase in eccentricity for additional giant planets, supplying a new mechanism to account for the high eccentricities of known extrasolar giant planets.